

WE CLAIM

1. A communication system comprising:
an optical communication network interconnecting a headend and a plurality of network units;
wherein the headend has a media access controller for issuing data grants and grouping information requests; wherein a data grant being issued at least partially in response to previously received grouping information; and
wherein at least some network units out of the plurality of network units are operable to:
receive data to be transmitted to the headend;
transmit grouping information associated with the received data; and
transmit data to the headend in response to data grants issued by the media access controller.
2. The system according to claim 1 wherein a data grant authorizes an identified network unit out of the plurality of network units to transmit a group of consecutive data cells during at least one consecutive timeslot.
3. The system according to claim 1 wherein the media access controller comprises a plurality of arbitrators.
4. The system according to claim 3 wherein each arbitrator is associated with a class of service out of a plurality of class of services.
5. The system according to claim 4 wherein the class of services comprise: provisioned bandwidth, guaranteed bandwidth, assured bandwidth and non-assured bandwidth.
6. The system according to claim 4 wherein the class of services include at least one class of service selected from the list consisting of: provisioned bandwidth, minimum latency, assured bandwidth, non-assured bandwidth, minimum drop and minimum jitter.
7. The system according to claim 1 wherein the headend is operable to transmit data to network units in consecutive frames; wherein each frame further comprises at least one data grant.

8. The system according to claim 7 wherein each frame further comprises a grouping information request.
9. The system according to claim 7 wherein each frame comprises a plurality of fixed length slots.
10. The system according to claim 1 wherein grouping information comprises grouping information units; wherein a grouping information unit represents a parameter of a group of data cells that are stored in a queue within a network unit.
11. The system according to claim 10 wherein each group of data cells comprises relevant payload and overhead signals.
12. The system according to claim 11 wherein a grouping information unit reflects the length of the relevant payload.
13. The system according to claim 11 wherein the media access controller is operable to determine an amount of grouping information to be sent from a network unit.
14. The system according to claim 13 wherein the determination is responsive to grouping information previously transmitted from the network unit and to a data threshold.
15. The system according to claim 14 wherein the determination is further responsive to an estimation of grouping information to be sent from the network units.
16. The system according to claim 14 wherein the data threshold reflects a maximal amount of data that can be transmitted from the network unit to the headend during a predefined time period.
17. The system according to claim 1 wherein at least some of the network units are not operable to generate grouping information; wherein the media access controller estimates grouping information relating to data being received said network units.
18. The system according to claim 1 wherein at least some network units out of the plurality of network units comprising:
 - a first input port for receiving variable length data packets; and

a segmenting and grouping information unit for segmenting a received variable length data packets to provide a group of fixed sized data cells; and for generating grouping information reflecting a parameter of the group of fixed sized cells.

19. The system of claim 18 wherein the at least some network units further comprise a classifier, for classifying incoming data packets in response to their service of class.
20. The system of claim 18 wherein the variable length data packets are Internet Protocol packets.
21. The system of claim 18 wherein the fixed sized cells are Asynchronous Transfer Mode cells.
22. The system according to claim 1 wherein at least some network units out of the plurality of network units comprising:
 - a second input port for receiving fixed sized cells; and
 - an assembly unit for grouping the fixed sized cells to fixed sized cell groups.
23. The system according to claim 22 wherein the at least some network unit further comprising a unit selected from the list consisting of:
 - a grouping information generator, for generating grouping information representative of a parameter of an group of fixed sized cells; and
 - a grouping information extractor, for extracting grouping information embedded within the group of fixed sized cells.
24. The system according to claim 1 wherein a media access controller is operable to issue data grants in response to at least one arbitration scheme.
25. The system of claim 24 wherein the received data belongs to a class of service out of a plurality of class of services.
26. The system of claim 25 wherein one arbitration scheme allocates data grants in a fixed manner.
27. The system of claim 25 wherein one arbitration scheme allocates data grants in response to grouping information, and to a transmission current credit.

28. A media access controller for controlling an access of a plurality of network units to a shared upstream channel, the media access controller being coupled to a receiver, for receiving grouping information from the plurality of network units; wherein grouping information reflect at least one parameter of fixed sized cell groups to be upstream transmitted over the shared upstream channel; wherein the media access controller comprising:

at least one arbitration unit, coupled between the receiver and a grant allocator, for arbitrating between requests to upstream transmit fixed sized cell groups; and

a grant allocator, for selecting data grants authorizing an upstream transmission of a group of fixed sized cells in response to the arbitration.

29. The media access controller according to claim 28 wherein fixed sized cell groups belong to a class of service out of a plurality of class of services; and wherein each arbitration unit out of the at least one arbitration units is operable to arbitrate between requests of the same class of service.

30. The media access controller according to claim 28 wherein at least one arbitration scheme allocates data grants in a fixed manner.

31. The media access controller according to claim 28 wherein one arbitration scheme allocates data grants in response to grouping information, and to a transmission current credit.

32. The media access controller according to claim 28 wherein the grant allocator is operative to receive allocated data grants from the at least one arbitrating unit and to select data grants in response to a predefined priority between the at least one arbitration unit.

33. The media access controller according to claim 28 wherein the grant allocator is operative to receive allocated data grants from the at least one arbitrating unit and to select data grants in response to a predefined priority between classes of service to which the data grants are associated with.

34. A method for allocating upstream bandwidth of a shared upstream channel of an optical network, the optical network interconnecting a headend with a plurality of network units, the method comprising the steps of:

determining grouping information to be upstream transmitted from at least one network unit;

receiving upstream transmitted grouping information; and

issuing data grants authorizing an identified network unit to transmit upstream data in response to previously received grouping information.

35. The method according to claim 34 wherein the optical network is a passive optical network.

36. The method according to claim 34 wherein the step of issuing comprising the steps of:
arbitrating between requests to transmit groups of fixed sized data cells;
allocating data grants in response to the arbitrating; and
selecting allocated data grants.

37. The method according to claim 36 wherein the step of arbitrating comprising performing at least two arbitration cycles; and wherein the step of selecting is responsive to a predefined priorities assigned to arbitration cycles.